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Test of Plasma Equilibrium Response against MHD Models Using Slowly Rotating 3D Magnetic Perturbations in DIII-D RMP Experiments[1] L.L. LAO, N.M. FERRARO, R.J. BUTTERY, T.E. EVANS, R.J. LA HAYE, E.J. STRAIT, A.D. TURNBULL, M.R. WADE, General Atomics, W. GUO, ASIPP, M.J. LANCTOT, Lawrence Livermore National Laboratory, E.A. LAZARUS, A.C. SONTAG, Oak Ridge National Laboratory, R. NAZIKIAN, Princeton Plasma Physics Laboratory, Y.Q. LIU, UKAEA — Slowly rotating non-axisymmetric magnetic perturbations provide a convenient means to study plasma response to perturbation fields in H-mode discharges using DIII-D diagnostics such as the edge Thomson scattering measurements of electron temperature. Magnetic perturbations with $n = 1-3$ have been routinely used to investigate plasma response in DIII-D RMP experiments. For $n = 1$, a $0.1-0.3\%$ perturbation of the poloidal equilibrium magnetic field can result in a large $2-4\%$ change in the edge magnetic topology. Perturbations from higher $n = 2$ and 3 typically result in smaller flux-surface distortions. In this study, the effects of 3D perturbation fields on plasma equilibria from these experiments are tested against theoretical predictions using 3D linear and non-linear MHD codes MARS-F, M3D-C1, and VMEC. First comparative results indicate that the response from stable helical kink modes contribute significantly to the observed plasma equilibrium responses. Details will be presented.

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